Report on the Martian Gullies and Their Earth Analogues Workshop

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Since their discovery with the Mars Global Surveyor Mars Orbiter Camera (MOC) in 1997, gullies have been of scientific interest based on their apparent geologic youth and morphology suggestive of formation involving water. The subsequent discovery with MOC of present-day gully activity, reported in 2006, fuelled this interest. However, it also created a conundrum: If gullies are still active today, is water involved? This led to the first workshop on martian gullies in 2008. In the near-decade since, the field has evolved significantly. Long-term monitoring efforts with the Mars Reconnaissance Orbiter Context Camera (CTX) and High-Resolution Imaging Science Experiment (HiRISE) revealed even more present-day activity in gullies, but seasonally confined to periods when active defrosting would be expected. Therefore, frost-related processes became a spotlight of focus. If frost is driving gully activity today, did it play a role in gully formation?

The Martian Gullies and their Earth Analogues workshop brought together the martian gullies community with their terrestrial counterparts. This included geomorphologists, climate modellers, and experimental lab work. With the layout of the workshop including many breaks for discussion amongst the participants, having such a diverse background all under one roof led to many productive conversations. At the end of each day, a group discussion was held. The Day 1 discussion session focused on defining the term "gully," as in the martian literature many things seem to be getting classified as "gullies" but perhaps inappropriately. On day 2, the discussion focused on frost-induced (CO_2-gas-lubricated) processes, and whether they are capable of forming gullies on Mars. Having terrestrial geologists in the room—particularly William Dietrich, one of the biggest names in terrestrial landslide and channel initiation work. While the room was in apparent agreement that these frost-related processes could mobilize loose fine-grained material within a pre-existing gully system, the question as to whether this process could mobilize large grains and/or incise channels into rock was raised. The take-home point that I attempted to emphasize during this session in my comments was that gullies are dynamic systems—likely evolving through multiple mechanisms, and how they formed initially is not necessarily related to the present-day activity within them.

As my Ph.D. research focuses on martian gullies, attending this conference was incredibly valuable from many standpoints. Having the opportunity to present my work in person to all of the key players in the gully community, getting the chance to have conversations with them one-on-one during the tea breaks, and being able to give input during the discussion sessions were all incredibly beneficial experiences career-wise. Of any conference I have attended during my Ph.D., this was undoubtedly the most useful and productive for my research.